CLAIMS

What we claim is:

1. A method for accessing a true lumen of a blood vessel from a sub-intimal plane of the vessel, comprising:

identifying a site to enter the true lumen from a position in the sub-intimal plane distal to a chronic total occlusion (CTO);

determining an orientation of the true lumen with respect to the sub-intimal plane at the selected site;

physically securing tissue of the sub-intimal plane at the selected site; and

establishing a path from the sub-intimal plane into the vessel true lumen.

2. A method for crossing a chronic total occlusion (CTO) in vasculature, comprising:

forming a track from a true lumen into a sub-intimal space of a blood vessel, wherein the track extends from a position proximal to the CTO in the true lumen to a position distal to the CTO in the sub-intimal space;

determining an orientation of the true lumen with respect to the sub-intimal plane at an identified re-entry site from a position in the sub-intimal plane, wherein the re-entry site is distal to the CTO;

physically securing tissue of the sub-intimal plane at the selected site; and

selectively forming a path from the sub-intimal plane back into the true lumen.

3. A catheter system for accessing a true lumen of a blood vessel from a sub-intimal plane of the vessel, comprising:

at least one visualization element for determining an orientation of the true lumen with respect to the sub-intimal plane at an identified entry site from a position in the sub-intimal plane distal to a chronic total occlusion (CTO);

at least one system for physically securing tissue of the sub-intimal plane at the entry site to the catheter system; and

at least one re-entry device for establishing and maintaining a path from the sub-intimal plane into the vessel true lumen.

4. A catheter system for crossing chronic total occlusions (CTOs) in vasculature, comprising:

means for forming a track from a true lumen into a sub-intimal space of a blood vessel, wherein the track extends from a position proximal to the CTO in the true lumen to a position distal to the CTO in the sub-intimal space;

means for determining an orientation of the true lumen with respect to the sub-intimal plane at an identified re-entry site, wherein the re-entry site is distal to the CTO;

means for physically securing tissue of the sub-intimal plane at the selected site; and

means for selectively forming a path from the sub-intimal plane back into the true lumen.